



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/791,258	03/02/2004	Yun Luo	TRW(TE)6922	2787
26294 7590 04/03/2009 TAROLLI, SUNDHEIM, COVELL & TUMMINO L.L.P. 1300 EAST NINTH STREET, SUITE 1700 CLEVELAND, OH 44114				
EXAMINER				
PARK, EDWARD				
ART UNIT		PAPER NUMBER		
2624				
MAIL DATE		DELIVERY MODE		
04/03/2009		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

10/791,258

**Applicant(s)**

LUO ET AL.

**Examiner**

EDWARD PARK

**Art Unit**

2624

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 04 December 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7, 11, 12, 17-22, 30 and 31 is/are rejected.
- 7) ☒ Claim(s) 8-10, 13-16 and 23-29 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB08)
- Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)
- Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ ~~Notice of Informal Patent Application~~
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Response to Amendment*

1. This action is responsive to applicant's amendment and remarks received on 12/4/08.  
Claims 1-31 are currently pending.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claims 1-5, 11, 12, 17-19** are rejected under 35 U.S.C. 103(a) as being unpatentable over Owechko et al (US 6,801,662 B1) in view of Gokturk et al (US 2004/0153229 A1).

Regarding **claim 1**, Owechko teaches an apparatus for tracking at least one head candidate, said apparatus comprising:

an image analyzer for analyzing an image signal ("recognizing the type of occupant and his position by combining different types of information extracted from a video stream generated by an imaging sensor"; Owechko: col. 2, lines 44-47) to identify at least one of a plurality of possible new head candidates within an area of interest and for providing data related to the identified at least one head candidate ("classifying the image features to produce object class

confidence data; and performing data fusion on the object class confidence data to produce a detected object estimate; Owechko: col. 2, lines 61-65); and

a tracking system that stores location information for at least one tracked head candidate (“coordinated are updated by estimating the centroid rectangle equivalent to the thresholded motion image computed in the region”; Owechko: col. 8, lines 8-20).

Owechko does not teach a candidate matcher that predicts the current position of a given tracked head candidate from the previous position and motion of the head to provide a projected head candidate position, selects a proper subset of the at least one of the plurality of possible new head candidates according to their distance from the predicted position, and evaluates the similarity of each member of the selected subset to the tracked candidate to determine if a new head candidate within the selected subset represents a current position of the tracked head candidate.

Gokturk, in the same field of “intelligent deployment and use of airbags” (Gokturk: paragraph [0002]), teaches a candidate matcher that predicts the current position of a given tracked head candidate from the previous position and motion of the head to provide a projected head candidate position (“head-tracking algorithm is to determine the location of the head in the current frame given the location and the shape in the previous frame”; “changes and motions in the scene can be modeled and analyzed with two different purposes: distinguish occupant motions from variations of coordinates and shapes that may occur as a consequence of sensing errors and occupant motions can be classified in order to distinguish animate from inanimate occupants”; Gokturk: paragraph [0151], [0138]), selects a proper subset of the at least one of the plurality of possible new head candidates according to their distance from the predicted position

(Gokturk: paragraph [0149], [0150], [0152]), and evaluates the similarity of each member of the selected subset to the tracked candidate to determine if a new head candidate within the selected subset represents a current position of the tracked head candidate (“the head is re-detected periodically (every few seconds to make sure another occupant does not appear in the scene)”; Gokturk: paragraph [0154]).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Owechko reference to utilize the candidate matcher of Gokturk, in order to correct “head tracking algorithms [that] lose track [of the head location] due to abrupt head movements, or abrupt environmental changes” (Gokturk: paragraph [0151]).

Regarding **claim 2**, Owechko discloses an image source that provides the image signal to the image analyzer (“means for capturing images of an area may comprise CMOS or CCD cameras or other devices known in the art that allow digital images of a viewed area to be captured”; Owechko: col. 3, lines 9-13).

Regarding **claim 3**, Owechko discloses wherein the image source includes a stereo camera (“stereo imaging system...deploying two vision sensors at a fixed distance apart”; Owechko: col. 7, lines 58-60).

Regarding **claim 4**, Owechko discloses wherein the candidate matcher updates the location information at the tracking system according to the determined matches (“coordinates are updated by estimating the centroid of the rectangle equivalent to the thresholded motion image computed in the region”; Owechko: col. 8, lines 14-20).

Regarding **claim 5**, Owechko discloses wherein a confidence value associated with the given tracked candidate is updated at the tracking system according to the evaluation of the

candidate matcher (“each classifier generates a class predication and confidence value”; Owechko: col. 4, lines 53-54).

Regarding **claim 11 and 12**, Owechko discloses all elements as applied to claim 1 above.

Owechko does not teach wherein the image analyzer includes means for performing a head candidate algorithm using the image signal to identify the at least one of the plurality of possible new head candidates in the area of interest and means for determining the position of the at least one of the plurality of possible new head candidates.

Gokturk teaches wherein the image analyzer includes means for performing a head candidate algorithm using the image signal to identify the at least one of the plurality of possible new head candidates in the area of interest (“various algorithms exist for the detection of heads”; Gokturk: paragraph [0149]) and means for determining the position of the at least one of the plurality of possible new head candidates (“head-tracking uses the location and shape information from a previous frame”; Gokturk: paragraph [0151]).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Owechko reference to utilize head candidate algorithm of Gokturk, in order to effectively deploy or not deploy an airbag depending on an occupant’s head which is “one of the more easy features of a person to track” (Gokturk: paragraph [0149]).

Regarding **claim 17**, Owechko discloses wherein said means for performing the head candidate algorithm includes means for determining at least one of a 3D spherical shape head candidate, a contour based head candidate, and a motion based head candidate from the image signal (“estimating the motion inside a rectangular region of interest”; Owechko: col. 8, lines 8-9).

Regarding **claim 18**, Owechko discloses an air bag and means for controlling the air bag in response to the current position of the at least one tracked head candidate (“enable/disable commands to airbag deployment systems”; Owechko: col. 3, lines 50-54).

Regarding **claim 19**, Owechko teaches an air bag restraining system for helping to protect an occupant of a vehicle upon the occurrence of a vehicle crash event, said apparatus comprising:

an air bag restraining device for, when actuated, helping to protect the vehicle occupant (“airbag deployment system should be triggered or not”; Owechko: col. 2, lines 30);

a stereo vision system for imaging an interior area of the vehicle and providing an image signal of the area of interest (“stereo image system”; Owechko: col. 7, line 38);

an image analyzer for analyzing the image signal (“recognizing the type of occupant position by combining different types of information extracted from a video generated by an imaging sensor”; Owechko: col. 2, lines 44-47) to identify at least one of a plurality of possible new head candidates within an area of interest and for providing data related to the identified at least one head candidate (“classifying the image features to produce object class confidence data; and performing data fusion on the object class confidence data to produce a detected object estimate”; Owechko: col. 2, lines 61-65); and

a tracking system that stores location information for at least one tracked head candidate (“coordinates are updated by estimating the centroid of the rectangle equivalent to the thresholded motion image computed in the region”; Owechko: col. 8, lines 8-20).

Owechko does not teach:

crash sensor for sensing a vehicle crash event and, when a crash event occurs, providing a crash signal;

an air bag controller for monitoring the crash sensor and controlling actuation of the air bag restraining device;

a candidate matcher that predicts the current position of a given tracked head candidate, selects a proper subset of the identified at least one of a plurality of possible new head candidates according to their distance from the predicted position, evaluates the similarity of each member of the selected subset to the tracked candidate to determine if a new head candidate within the selected subset represents a current position of the tracked head candidate, and provides a signal to the air bag controller indicating the current position of each of the at least one tracked head candidates;

the air bag controller controlling actuation of the air bag restraining device in response to both the crash signal and the current position of the at least one tracked head candidate.

Gokturk, in the same field of “intelligent deployment and use of airbags” (Gokturk: paragraph [0002]), teaches:

crash sensor for sensing a vehicle crash event and, when a crash event occurs, providing a crash signal (“determination is made as to whether an event has occurred in which the airbag is to be deployed .... crash sensor”; Gokturk: paragraph [0049]);

an air bag controller for monitoring the crash sensor and controlling actuation of the air bag restraining device (“control data for deploying the airbag is determined and outputted”; Gokturk: paragraph [0052]);

a candidate matcher that predicts the current position of a given tracked head candidate (“head-tracking algorithm is to determine the location of the head in the current frame given the location and the shape in the previous frame”; Gokturk: paragraph [0151] [0138]), selects a

proper subset of the at least one of the plurality of possible new head candidates according to their distance from the predicted position (Gokturk: paragraph [0149], [0150], [0152]), and evaluates the similarity of each member of the selected subset to the tracked candidate to determine if a new head candidate within the selected subset represents a current position of the tracked head candidate (“the head is re-detected periodically (every few seconds to make sure another occupant does not appear in the scene)”; Gokturk: paragraph [0154]), and provides a signal to the air bag controller indicating the current position of each of the at least one tracked head candidates (“provides the position of the tracking feature is tracked”; Gokturk: paragraph [0051]);

the air bag controller controlling actuation of the air bag restraining device in response to both the crash signal and the current position of the at least one tracked head candidate (“control data may be based at least in part on the position information determined in step 140”; Gokturk: paragraph [0052]).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Owechko reference to utilize the crash sensor, air bag controller, candidate matcher, and an air bag controller of Gokturk, in order for automated “decision on when an airbag is deployed, as well as the power level in which the airbag is deployed” to ensure the “safety and effectiveness of an airbag deployment system” (Gokturk: paragraph [0034]).

4. **Claims 6, 7** are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Owechko et al (US 6,801,662 B1) with Gokturk et al (US 2004/0153229 A1) as applied to claim 1 above, and further in view of Gokturk03 et al (US 2003/0235341). (The Gokturk reference (US 2003/0235341) will be referred to as Gokturk03).

Regarding **claim 6**, Owechko and Gokturk combination discloses all elements as applied to claim 1 above.

The Owechko and Gokturk does not teach wherein the candidate matcher selects a predetermined number of the identified at least one of a plurality of possible new head candidates that are closest to the predicted location.

Gokturk03 teaches wherein the candidate matcher selects a predetermined number of the identified at least one of a plurality of possible new head candidates that are closest to the predicted location (“new search space [for head candidate] can be defined as a band around the ellipse of the pervious frame ... the width of this band can be between 10 to 100 pixels depending on the resolution of the image”; Gokturk03: paragraph [0060]).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Owechko and Gokturk combination to utilize a candidate matcher that selects a head candidate near the predicted location of Gokturk03, in order for faster, efficient tracking of the head candidate since “the search space is around the detected head, as opposed to the full image” (Gokturk03: paragraph [0060]).

Regarding **claim 7**, Owechko and Gokturk combination discloses all elements as applied to claim 1 above.

Owechko and Gokturk combination does not teach wherein the candidate matcher determines at least one threshold distance based on the projected location and selects all of the identified at least one of a plurality of possible new head candidates falling within a selected one of the determined at least one threshold distance.

Gokturk03 teaches wherein the candidate matcher determines at least one threshold distance based on the projected location and selects all of the identified at least one of a plurality of possible new head candidates falling within a selected one of the determined at least one threshold distance (“new search space [for head candidate] can be defined as a band around the ellipse of the pervious frame ... the width of this band can be between 10 to 100 pixels depending on the resolution of the image”; Gokturk03: paragraph [0060]).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Owechko and Gokturk combination to utilize a candidate matcher that determines a threshold distance of Gokturk03, in order for faster, efficient tracking of the head candidate since “the search space is around the detected head, as opposed to the full image” (Gokturk03: paragraph [0060]).

5. **Claims 20, 21, 22, and 30** are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Owechko et al (US 6,801,662 B1) with Gokturk et al (US 2004/0153229 A1), and further in view of Gokturk03 et al (US 2003/0235341). (The Gokturk reference (US 2003/0235341) will be referred to as Gokturk03).

Regarding **claim 20**, Owechko teaches a head candidate matching method for determining a current location of a previous head candidate, the method comprising the steps of: imaging a class object and providing an image signal of an area of interest (“means for capturing images of an area occupied by at least one object”; Owechko: col. 3, lines 4-5);

Owechko does not teach:

identifying at least one of a plurality of possible new head candidates and associated location data from the image signal;

predicting the current location of the previous head candidate according to its previous location and motion;

selecting a proper subset of the identified at least one of the plurality of possible new head candidates based on the distance of each of the identified at least one of the plurality of possible new head candidates from the predicted location; and

comparing each of the selected subset of new head candidates to the previous head candidate across at least one feature.

Gokturk teaches identifying at least one of a plurality of possible new head candidates and associated location data from the image signal; predicting the current location of the previous head candidate according to its previous location and motion (“head-tracking algorithm is to determine the location of the head in the current frame given the location and the shape in the previous frame”, “the head is re-detected periodically (every few seconds to make sure another occupant does not appear in the scene)”, “changes and motions in the scene can be modeled and analyzed with two different purposes: distinguish occupant motions from variations of coordinates and shapes that may occur as a consequence of sensing errors and occupant motions can be classified in order to distinguish animate from inanimate occupants”; Gokturk: paragraph [0151], [0154], [0138]).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Owechko reference to identify a new head candidate and predict the current location of Gokturk, in order to correct “head tracking algorithms [that] lose track [of the head location] due to abrupt head movements, or abrupt environmental changes” (Gokturk: paragraph

[0151]) which leads to an increase in accuracy and safety for the occupant in an event of an accident.

Gokturk03 teaches selecting a proper subset of the identified at least one of the plurality of possible new head candidates based on the distance of each of the identified at least one of the plurality of possible new head candidates from the predicted location (“new search space [for head candidate] can be defined as a band around the ellipse of the previous frame ... the width of this band can be between 10 to 100 pixels depending on the resolution of the image... the edges”; Gokturk03: paragraph [0060]) and comparing each of the selected subset of new head candidates to the previous head candidate across at least one feature (“checking if the ellipse is a good fit with a small residue, and also comparing its size to the head size determined in detection”; Gokturk03: paragraph [0060]).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Owechko with Gokturk combination as stated above, to select a subset of new head candidates based on distance and compare to a previous frame of Gokturk03, in order for increased accuracy and efficiency in tracking the head candidate since “the search space is around the detected head, as opposed to the full image” (Gokturk03: paragraph [0060]).

Regarding **claim 21**, Owechko teaches wherein the step of imaging a class object includes using a stereo camera (“stereo imaging system...deploying two vision sensors at a fixed distance apart”; Owechko: col. 7, lines 58-60).

Regarding **claim 22**, the Owechko, Gokturk, and Gokturk03 combination discloses all elements as applied to claim 20.

The Owechko, Gokturk, and Gokturk03 combination as applied to claim 20 does not teach:

wherein selecting a subset of the identified at least one of a plurality of possible new head candidates includes selecting a predetermined number of the identified at least one of a plurality of possible new head candidates that are closest to the predicted location.

Gokturk03 further teaches:

wherein selecting a subset of the identified at least one of a plurality of possible new head candidates includes selecting a predetermined number of the identified at least one of a plurality of possible new head candidates that are closest to the predicted location (“new search space [for head candidate] can be defined as a band around the ellipse of the previous frame ... the width of this band can be between 10 to 100 pixels depending on the resolution of the image... the edges”; Gokturk03: paragraph [0060]);

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Owechko, Gokturk, Gokturk03 combination as applied above to select a subset closest to the predicted location as suggested by Gokturk03, in order for faster, efficient tracking of the head candidate since “the search space is around the detected head, as opposed to the full image” (Gokturk03: paragraph [0060]) with increased accuracy, detection, and tracking of the occupant’s head in the midst of non-head candidates with elliptical features.

Regarding **claim 30**, Owechko teaches a method for tracking a previously identified head candidate, comprising an imaging a class object and providing an image signal of an area of interest (“means for capturing images of an area occupied by at least one object”; Owechko: col. 3, lines 4-5).

Owechko does not teach:

identifying at least one of a plurality of possible new head candidates and associated location data from the image signal;

predicting the current location of the previous head candidate according to its previous location and motion;

defining at least one threshold distance around the predicted location; and

updating a tracking confidence value associated with the previously identified head candidate according to respective positions of the identified at least one of the plurality of new head candidates relative to the at least one defined threshold distance.

Gokturk teaches:

identifying at least one of a plurality of possible new head candidates and associated location data from the image signal; predicting the current location of the previous head candidate according to its previous location and motion (“head-tracking algorithm is to determine the location of the head in the current frame given the location and the shape in the previous frame”, “the head is re-detected periodically (every few seconds to make sure another occupant does not appear in the scene)”, “changes and motions in the scene can be modeled and analyzed with two different purposes: distinguish occupant motions from variations of coordinates and shapes that may occur as a consequence of sensing errors and occupant motions can be classified in order to distinguish animate from inanimate occupants”; Gokturk: paragraphs [0151], [0154],[0138]); and

updating a tracking confidence value associated with the previously identified head candidate according to respective positions of the identified at least one of the plurality of new

head candidates relative to the at least one defined threshold distance (“system confidence is built up in the physical-even 1430 reasoning layer by accumulating the decisions from several frames”; Gokturk: paragraph [0154]).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Owechko reference to identify a new head candidate, predict the current position, and update the tracking confidence value as suggested by Gokturk, in order to correct “head tracking algorithms [that] lose track [of the head location] due to abrupt head movements, or abrupt environmental changes” (Gokturk: paragraph [0151]) which leads to an increase in accuracy and safety for the occupant in an event of an accident.

Gokturk03 teaches defining at least one threshold distance around the predicted location (“new search space [for head candidate] can be defined as a band around the ellipse of the previous frame ... the width of this band can be between 10 to 100 pixels depending on the resolution of the image... the edges”; Gokturk03: paragraph [0060]).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Owechko with Gokturk combination as applied above to define the threshold distance as suggested by Gokturk03, in order to for faster, efficient tracking of the head candidate since “the search space is around the detected head, as opposed to the full image” (Gokturk03: paragraph [0060]) with increased accuracy, detection, and tracking of the occupant’s head in the midst of non-head candidates with elliptical features.

6. **Claim 31** is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Owechko et al (US 6,801,662 B1), Gokturk et al (US 2004/0153229 A1), Gokturk03 et al (US

2003/0235341), and further in view of Guthrie (US 5,973,732). (The Gokturk reference (US 2003/0235341) will be referred to as Gokturk03).

Regarding **claim 31**, the Owechko, Gokturk, Gokturk03 combination discloses all elements as applied to claim 30 above.

Owechko, Gokturk, Gokturk03 combination does not teach wherein updating the tracking confidence value includes decreasing the tracking confidence value when no identified new head candidate is encompassed by a selected one of the defined at least one threshold distance.

Guthrie teaches wherein updating the tracking confidence value includes decreasing the tracking confidence value when no identified new head candidate is encompassed by a selected one of the defined at least one threshold distance (“when an object can no longer be tracked, the system allows the persistence value to decrease to zero and then evaluates the progress of that object”; Guthrie: col. 7, lines 31-39).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Owechko, Gokturk, Gokturk03 combination as applied in claim 30 to decrease the tracking confidence value as suggested by Guthrie, in order to “track [the] object for as long as possible” (Guthrie: col. 7, lines 31-39) without compromising the accuracy of the head tracking system and which ensures that the tracked object is an actual head candidate.

#### ***Allowable Subject Matter***

7. Claims 8, 9, 10, 13, 14, 15, 16, 23, 24, 25, 26, 27, 28, 29 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claim 8, none of the references of record alone or in combination suggest or fairly teach wherein a confidence value associated with the given tracked candidate is updated according to the position of the selected subset of the identified at least one of a plurality of possible head candidates relative to the at least one threshold distance and the evaluated similarity of identified at least one of a plurality of possible head candidates to the tracked candidate.

Regarding claims 9, 10, none of the references of record alone or in combination suggest or fairly teach wherein the candidate matcher matches a given tracked head candidate with one of the selected subset of the identified at least one of a plurality of possible new head candidates according to respective similarity scores associated with the subset of new head candidates, a given similarity score reflecting a degree to which an associated new head candidate resembles the tracked head candidate across at least one feature; and wherein a given similarity score is calculated by a pattern recognition classifier.

Regarding claims 13, 14, 15, 16, none of the references of record alone or in combination suggest or fairly teach wherein the means for performing the head candidate algorithm includes first determining means for determining a blob image from the image signal; wherein said means for performing the head candidate algorithm further includes second determining means for determining a contour of the blob image and establishing a contour image in response thereto; wherein said means for performing the head candidate algorithm further includes third determining means for determining turning point locations of the contour image; and wherein said means for performing the head candidate algorithm further includes means for performing

an ellipse fitting algorithm for determining the quality of ellipse fits of the contour image between determined turning point locations.

Regarding claims 23, 24, 25, 26, 27, 28, 29, none of the references of record alone or in combination suggest or fairly teach wherein selecting a subset of the identified at least one of a plurality of possible new head candidates includes establishing a threshold distance around the predicted location and selecting every new head candidate within the threshold distances; wherein selecting a subset of the identified at least one of a plurality of possible new head candidates includes establishing a plurality of threshold distances around the predicted location and selecting every new head candidate within a selected one of the plurality of threshold distances; selecting the smallest threshold distance encompassing at least one new head candidate; updating a tracking confidence associated with the previous head candidate according to the selected threshold distance; an inner threshold distance and an outer threshold distance and the method further comprising comparing a confidence value associated with a selected new head candidate to a threshold value only if the selected new head candidate falls between the inner threshold distance and the outer threshold distance; wherein comparing the selected subset of new head candidates to the previous head candidate includes computing a similarity score for each selected new head candidate based upon its similarity to the previous head candidate and identifying the new head candidate with the best similarity score as the current location of the previous head candidate; wherein computing the similarity score for a given new head candidate includes providing feature data associated with the new head candidate and feature data associated with the previous head candidate to a pattern recognition classifier.

***Response to Arguments***

8. Applicant's arguments filed on 12/4/08, in regards to claims 1, 19, have been fully considered but they are not persuasive. Applicant argues that neither Owechko or Gokturk teach or suggest a candidate matcher that predicts the current position of a given tracked head candidate from the previous position and motion of the head to provide a projected head candidate position (see pg. 12, last paragraph). This argument is not considered persuasive since it is disclosed within Gokturk, paragraph [0151], where "head-tracking algorithm is to determine the location of the head in the current frame given the location and the shape in the previous frame". Applicant argues that the head tracking function occurs in the frame rate layer and not in the physical event layer and therefore Gokturk does not teach the limitation (see pg. 12, last paragraph). In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., physical event) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Examiner notes that Gokturk teaches the limitation and the argument of whether it is tracked within the frame rate layer or physical event layer is irrelevant.

Applicant argues that Gokturk does not teach the selection of a subset of a plurality of possible new head candidates according to their distance from the projected head candidate position (see pg. 13, second paragraph). This argument is not considered persuasive since the limitation is taught within paragraph [0150], [0152]), partition of an image, the classifier function determines if that partition contains an image of a face or not, while testing a new frame

to see if it contains any faces, the image is first portioned in several ways (i.e. different sizes) into sub-images, each sub-image is then fed to the classifier and tested to contain a face.

Applicant argues that one of skill in the art would not be able to utilize the depth-based pixel grouping of Gokturk with the Owechko system to select among existing head candidates identified in Owechko (see pg. 13, last paragraph – pg. 14, first paragraph). In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, it would have been obvious to combine Gokturk with Owechko in order to correct “head tracking algorithms [that] lose track [of the head location] due to abrupt head movements, or abrupt environmental changes” (Gokturk: paragraph [0151]). Furthermore, in response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicant argues that Gokturk cannot represent the recited selection of a subset of the at least one of the plurality of possible new head candidates according to their distance from the projected head candidate position by a candidate matcher since there is an initial estimate of the head shape location in the first one but not in the latter (see pg. 14, second paragraph). This

argument is not considered persuasive since the applicant has misinterpreted the section within paragraph [00154], since it actually means that the head tracking initially estimates the head shape and location and the head detection does not initially estimate the head shape and location.

Applicant argues that the combination of Gokturk with Owechko can not be utilized since the determination that occurs is too slow for effective use in an occupant protection system or when the head tracking has failed (see pg. 14, last paragraph – pg. 15, first paragraph). In response to applicant's argument that the combination of Gokturk with Owechko can not be utilized since the determination that occurs is too slow for effective use in an occupant protection system or when the head tracking has failed, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Applicant argues that the word, prior, is supported by the specification and within the claim (see pg. 15, second paragraph). This argument is not considered persuasive since the word, prior, is not cited within the claim language. If applicant wants to argue claim language then the examiner suggests that claim language be utilized verbatim to avoid misinterpretation or misunderstanding. Examiner notes that applicant appears to be interpreting “prior” as being equivalent to “given tracked”.

Regarding claims 2-5, 11, 12, 17, 18, applicant argues that the claims are allowable due to the same reasons as stated above for claim 1 (see pg. 15, third paragraph). This argument is

not considered persuasive since claim 1 stands rejected and the arguments and rejection can be seen above.

Regarding claims 6, 7, applicant argues that these claims are allowable due to the claim limitations defining over the prior art (see pg. 15, last paragraph – pg. 16, first paragraph). Applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentable distinguishes them from the references.

Applicant's arguments, see pg. 15, last paragraph, filed 12/4/08, with respect to claims 8, 9, 10 have been fully considered and are persuasive. The rejection of claims 8, 9, 10 has been withdrawn.

Applicant's arguments, see pg. 16, second paragraph, third paragraph, filed 12/4/08, with respect to claims 13, 14, 15, 16 have been fully considered and are persuasive. The rejection of claims 13, 14, 15, 16 has been withdrawn.

Regarding claims 20, 30, applicant argues that motion data is not used in the predication of the head candidate position (see pg. 16, last paragraph – pg. 17, first paragraph). This argument is not considered persuasive since it is disclosed within Gokturk, paragraph [0151], where "head-tracking algorithm is to determine the location of the head in the current frame given the location and the shape in the previous frame". Applicant argues that the head tracking function occurs in the frame rate layer and not in the physical event layer and therefore Gokturk does not teach the limitation (see pg. 12, last paragraph). In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., physical event) are not recited in the rejected claim(s).

Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Examiner notes that Gokturk teaches the limitation and the argument of whether it is tracked within the frame rate layer or physical event layer is irrelevant.

Regarding claims 21, 22, applicant argues that these claims are allowable due to the same reasons as stated for claim 20 (see pg. 17, second paragraph). This argument is not considered persuasive since claim 20 stands rejected and the arguments and rejection can be seen above.

Applicant's arguments, see pg. 17, second paragraph, filed 12/4/08, with respect to claims 23-29 have been fully considered and are persuasive. The rejection of claims 23-29 has been withdrawn.

Regarding claim 31, applicant argues that these claims are allowable due to the same reasons as stated for claim 30 (see pg. 17, last paragraph). This argument is not considered persuasive since claim 30 stands rejected and the arguments and rejection can be seen above.

### ***Conclusion***

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to EDWARD PARK whose telephone number is (571)270-1576. The examiner can normally be reached on M-F 10:30 - 20:00, (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikram Bali can be reached on (571) 272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Edward Park  
Examiner  
Art Unit 2624

/Edward Park/  
Examiner, Art Unit 2624

/Vikram Bali/  
Supervisory Patent Examiner, Art Unit 2624